

Society of Naturalists, edited by Mr. J. Borodine, is devoted to botany. Mr. Y. N. Voronoff describes his botanical excursion in the summer of 1902 in Abkhasia (Caucasus). The whole region is rich in Alpine flora, of which the writer collected thousands of specimens and hundreds of species. Mr. Voronoff supplements Alboff's work on the flora of Colchis, and gives a list of 129 plants, of which four are newly described. Mr. E. Ispolatoff's article on the vegetation of the eastern portion of the Novgorod government contains descriptions and lists of that found in forest, marsh, and meadow land respectively, with observations on the influence of man upon local vegetation. He notes that localities suitable for human habitation are also favourable to vegetation. The presence of primitive Siberian flora in certain districts is accounted for by the wild, sparsely populated nature of the country, as contrasted with the more cultivated areas of western Russia. Mr. Ispolatoff gives a list of local names of plants, e.g. *Cypripedium calceolus* (Adam's head), *Aegropodium podagria* (bear's paw), *Ranunculus* (jaundice, hen's blindness). The bulk of the journal is occupied with Mr. Leonid Ivanoff's papers on phosphorus and its relations to plant life, with results of experiments. Mr. J. L. Serbinoff furnishes preliminary notes on water plants and fungi of the Crimea, a field scarcely studied. The mountain districts are poor in water plants, while there are more in the south, but on account of their comparative rarity considerable time must elapse before a complete list can be compiled.

There is a wealth of interest for the geologist in part v. of vol. xxxiii. of the Transactions of the St. Petersburg Society of Naturalists, devoted to geology and mineralogy. Mr. W. Lemann writes on the Jurassic deposits of Orlovka, and furnishes a plate of fossils. Mr. B. Popoff describes a new method of investigating spherulitic formations, with diagrams. Besides notes on diabasic rocks on the shores of Lake Onega, by Mr. S. A. Jakovleff, and on the island of Pargas, by Mr. Sustchinsky, Mme. Jeremina and Mr. Loewinson-Lessing describe expeditions in the Mugodjaren (Ural) mountains, and the former writes on the spherulitic formations in this range, with numerous illustrations. *Résumés* of the articles appear, mostly in German.

In part ix. of vol. xxxvii. of the Journal of the Physico-chemical Society of St. Petersburg University appears a list of minutes and papers, the volume containing more than 1300 pages. Mr. V. Menschutkin writes on the action of water on etherates and combinations with ether-salts, and Mr. A. Gorboff on the static character of the equilibrium of physicochemical systems. Mr. E. Orloff furnishes a new synthesis of benzylideneimides, and a lengthy paper on the phosphorescence of some organic compounds between $+100^{\circ}$ and -190° appears from the pen of Mr. P. Borissoff. The purpose of Mr. Borissoff's work was to examine the influence of temperature on the phosphorescence of certain organic compounds, and to determine the relation of fluorescence to phosphorescence. A memoir of Mr. V. A. Mokievsky, a promising laboratory worker cut off all too soon, is given by Mr. S. Lebedeff.

In part ii. of vol. xxxv. of the Transactions of the St. Petersburg Society of Naturalists, Mr. V. N. Tonkoff describes experiments in embryology in connection with dual formations, and gives a bibliography of works on embryology, development, abnormal formations, &c. The writer appears to be of opinion, judging by results of experiments by pressure and osmosis on the eggs of frogs, fish, and medusæ, that similar results would be produced in the case of other ova. This article is illustrated by two plates. Mr. A. V. Zhuravsky contributes notes of a zoological journey in the Siberian tundra. This region, largely volcanic, has been summed up as "dead land (i.e. clay) and lakes." For the naturalist there is abundant material for study in the lakes and on the sloping shores. Of the fauna, *Mus amphibius* is very prevalent, and finds its way on board steamers and other craft as an emigrant. A list of mollusca occupies several pages. A short *résumé* in German follows each article.

Vol. xxxv., part iv., of the Transactions of the St. Petersburg Society of Naturalists, devoted to zoology, is chiefly taken up with articles by Mr. W. M. Schimkevitch, one of the editors. He is responsible for notes on the

development of *Thelyponus*, experimental observations of the eggs of *Philine aperta*, and a preliminary article on the theory of mutation. His paper of more general interest is that on the instincts of domestic animals, in which certain well-known habits of the dog are discussed, as burying of bones, &c., without apparent reason. Most of these are followed by a German *résumé*. The concluding article, by Mr. S. Susloff, treats of phagocytes in relation to insects, with diagrams and a bibliography.

Mr. N. Andrussoff has issued part i. of his materials for the geology of the Aralo-Caspian region (Transactions of the Aralo-Caspian Expedition), which he has studied for twenty years at intervals. The places covered in this part include the Krasnovodsk peninsula, Great and Little Balchan, Djanak, and Ustiurt. Notwithstanding its proximity to Krasnovodsk and the railway, the geological features of the Kubadagh have been very little studied. In his first chapter Mr. Andrussoff summarises the work of previous explorers since Eichwald visited the neighbourhood in 1825. The work is illustrated with plans, sections, and views.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE professor of mechanical engineering at the City and Guilds Technical College, Finsbury, is about to appoint a chief assistant to take charge of the new engineering laboratory. Particulars of the appointment will appear in our advertising columns.

THE question of the extent of the training in science, and especially in physics, which one who intends ultimately to become a physics teacher should receive at the high-school stage of his career, is treated with great insight by Dr. T. Fischer of Munich, in a recent article in *Natur und Schule*. It will be remembered that Dr. Fischer spent some time in this country investigating our methods of teaching science, and that his observations are embodied in his book "Der naturwissenschaftliche Unterricht in England." His present article is largely a plea that even at this stage the future teacher should be brought into close contact with physical apparatus, and should be taught to handle simple tools and fit together apparatus. Dr. Fischer's ideal of a teacher is one who by the end of his training has not only learnt to read with understanding the original work of the great masters, but has carried out a piece of research himself. He recognises, however, the difficulty of his last demand even in his own country, and we in this country must, we fear, look on it as a counsel of perfection for many years to come.

THE new syllabus of classes at the Sir John Cass Technical Institute, Aldgate, shows that the work of the various departments has been considerably re-organised since last year. Apart from systematic courses in physics, mathematics, and chemistry, special courses of instruction are now given in physical chemistry, brewing and malting, and in several branches of advanced physics, including radio-activity. The course in physical chemistry includes general physical chemistry, electrochemistry, and a laboratory course of practical work; the instruction in brewing and malting also includes laboratory work of a technical character in addition to a course of lectures designed for those engaged in the brewing and malting industries. The teaching in metallurgy, which for the past four years has formed a distinctive part of the work of the institute, has now been established as a separate department, and a full graded curriculum extending over three years is provided.

THE London County Council desires to direct attention to the facilities offered for evening instruction in the various institutions maintained by it or under its control. In the various polytechnics, technical institutes, and schools of art situated in the county, classes in science, art and technology, music, artistic handicrafts, &c., will be re-opened towards the end of the present month. These institutions provide instruction of an advanced or technical character. The council offers annually scholarships and exhibitions to the total value of 1500l. for competition among students of polytechnics, technical insti-

tutes, and art schools. In thirty-six London County Council schools, centres for instruction in commercial and science and art subjects will be opened. These centres are in a degree contributory to the polytechnics and technical institutes mentioned above and are primarily intended for students not sufficiently advanced for the polytechnic classes. Advanced work, however, is taken in many of the subjects. In 237 London County Council school buildings situated in every part of London, ordinary evening schools will be opened this session. The instruction will, as a rule, be of a character preparatory to that given in the centres.

THE educational demands of the organised workers of this country are expressed in the following points of a resolution adopted at the Trade Union Congress at Bath last week:—(1) The State maintenance of school children. (2) Scientific physical education with individual medical inspection, and records of the physical development of all children attending State schools, and skilled medical attendance for any requiring it, and in order to secure this:—(a) The formation of a properly staffed medical department at the Board of Education, the head of which shall be directly responsible to the Minister of Education, to whom he shall report annually. (b) The payment of an adequate grant from the Imperial Exchequer for purposes of medical inspection. (c) The establishment under every education authority of scientifically organised open-air recovery schools, the cost to be borne by the community as a whole, and not in any part by charitable contributions. (3) The complete dissociation of reforms (1) and (2) from Poor Law administration. (4) A national system of education under full popular control, free and secular from the primary school to the university. (5) That secondary and technical education be an essential part of every child's education, and secured by such a reform and extension of the scholarship system as will place a maintenance scholarship within the reach of every child, and thus make it possible for all children to be full-time day pupils up to the age of sixteen. (6) That the best intellectual and technical training be provided for the teachers of the children, that each educational district shall be required to train the number of pupil teachers demanded by local needs, and to establish training colleges, preferably in connection with universities or university colleges. (7) That the provision of educational buildings and facilities be obligatory upon the local authority, who shall always retain administrative control of the buildings and facilities so provided. (8) That the cost of education shall be met by grants from the Imperial Exchequer, and by the restoration of misappropriated educational endowments. (9) That it be an instruction to the Parliamentary Committee of the Trade Union Congress to formulate these proposals in a Bill to be laid before Parliament during the forthcoming session.

FROM tables published in *Science* of August 30, it appears that the total number of degrees of doctor of philosophy and doctor of science conferred by the universities of the United States this year was 327, which is almost exactly the same as in 1905 and 1906, when the numbers were, respectively, 325 and 326. The average number for the past ten years is 271. Of 2715 doctorate degrees conferred during the past ten years, 1232, somewhat less than half, have been in the natural and exact sciences. The relative proportion of degrees in the humanities and in the sciences has not altered appreciably in the ten years covered by the statistics. The Johns Hopkins has conferred more degrees in the sciences than any other institution, but is closely followed by Chicago, and at a not very considerable distance by Harvard, Columbia, and Yale. Fifty-five per cent. of the degrees conferred at the Johns Hopkins have been in the sciences, and 57 per cent. at Cornell, whereas in the other leading institutions the percentage is decidedly less—46 at Chicago, 42 at Harvard and Columbia, and 40 at Yale and Pennsylvania. Of the 1232 degrees conferred in the sciences during the past ten years, chemistry leads with 320 doctorates; then follow in order of numbers, physics, 155; zoology, 147; psychology, 134; botany, 126; and mathematics, 121. The remainder of the degrees are divided among fourteen other sciences, meteorology and geography being at the bottom of the list with one doctorate each.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society. June 27.—“On the Force required to Stop a Moving Electrified Sphere.” By G. F. C. Searle, F.R.S.

If F be the force which must be applied to the sphere at any time t , after it has been brought to rest at $t=0$, the positive direction of F being opposite to that of u , the initial velocity, the momentum given up by the electromagnetic field from $t=0$ to $t=t$ is

$$\int_0^t F dt.$$

During this period the force F does no work, since the sphere is at rest, and hence the energy is unchanged during this period.

At the time t let the sphere be restarted with the same velocity u without change of direction, and let G be the force which must be applied to the sphere at any subsequent time in the direction of u in order to maintain the velocity u . This force lasts from $t=t$ to $t=t'$, where $t'-t$ is determined by the condition that in the time $t'-t$ the pulse formed on restarting the system has completely passed over the sphere. During the interval $t'-t$, the momentum is increased by

$$\int_t^{t'} G dt,$$

and hence the total gain of momentum is

$$\int_t^{t'} G dt - \int_0^t F dt.$$

During the interval $t'-t$, the energy has been increased by

$$u \int_t^{t'} G dt.$$

The stopping and the restarting of the sphere each give rise to a pulse, and the compound pulse so formed carries off energy W' and momentum P' . Before the system was stopped the energy of the electromagnetic field was $U+T$ and its momentum was M , and at an infinite time after the stopping and restarting the energy is $U+T+W'$ and the momentum is $M+P'$, since the energy and momentum in the parts of the field outside the compound pulse ultimately vanish.

Equating the two expressions for the gain of momentum, we have

$$\int_t^{t'} G dt - \int_0^t F dt = P'.$$

Similarly,

$$u \int_t^{t'} G dt = W'.$$

Hence

$$\int_0^t F dt = W'/u - P', \quad (1)$$

and thus we find that the force required to stop the system is given by

$$F = \frac{d}{dt} \left(\frac{W'}{u} - P' \right). \quad (2)$$

This force will become zero as soon as $W'/u - P'$ becomes constant, which will occur as soon as t is so great that the two pulses due to the stopping and restarting do not overlap.

It follows from (2) that, if F_0 be the force required to stop a sphere of radius a with a uniform surface-charge Q ,

$$F_0 = \frac{Q^2}{2Ka^2} \left(\frac{v}{u} - \frac{v^2 - u^2}{2u^2} \log \frac{v+u}{v-u} \right),$$

where v is the velocity of light. When the sphere has a uniform volume-charge

$$F = \frac{3}{8} a^{-4} (16a^3 vt - 12a^2 v^2 t^2 + v^4 t^4) F_0.$$

PARIS.

Academy of Sciences, September 2.—M. A. Chauveau in the chair.—Caryolysis in the nidorian glands of *Genetta senegalensis*: Joannes Chatin. A study of nuclear degeneration in the peripheal glands. It is shown that this is a form of true caryolysis, exactly corresponding to the disappearance of the nucleus in the true sebaceous cell.—Physically similar fluids: M. Jouguet.—The action